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NASA Lyndon B. Johnson Space Center
Earth Observations Division
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Subject: Contract NAS9-13304 Monthly Progress Report

(E73-10811) [COORDINATION OF GROUND
TRUTH AND BASIC ALTIMETER DATA PROCESSING
REQUIREMENTS] Monthly Progress Report,
1-30 Apr. 1973 (Research Triangle Inst.)
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Due to last minute problems with aircraft ground truth support and clarifying data processing responsibilities, the Milestone Plan was not sent until 2 May. We feel, however, that the inconvenience of the delay was more than offset by the more current validity of the Milestone Plan. Efforts this period have been directed toward obtaining theoretical estimates of ground truth data accuracy and toward coordinating ground truth and data processing requirements with other altimeter experimenters.

Problem Areas

Present commitments by JSC of the NOAA C-130 aircraft for ground truth support in the North Atlantic do not include this investigation. Since the NASA-Wallops Station aircraft will not be able to acquire ground truth in this area, it appears that, for SL-2, no aircraft ground truth in the North Atlantic will be available for this investigation. We are currently investigating the suitability of other sensors presently in the North Atlantic area. It is expected that sufficient ground truth data can be obtained to permit a partial correlation with altimeter derived data. In addition, there is a possibility (albeit small) that the NOAA C-130 can give partial support to this investigation. Thus, we see no reason for canceling our request for altimeter activation over the North Atlantic.

Investigation Results

Using the mean-square slope data obtained by Cox and Munk, we have determined that the two term power series approximation (the mean-square slope approximation) to the waveheight correlation function yields an

4pp.

erroneous correlation of ocean surface wind speed and σ^0 . We have found that σ^0 as computed using the correlation function is very insensitive to surface wind speed. Thus, using measured oceanographic data and the theoretical formulation for σ^0 , we conclude that the estimation of "sea-state" from near-normal incidence σ^0 is not feasible.

In order to verify this conclusion using altimeter derived σ^0 data, we estimate that ground truth waveheight spectral data must cover the range of about $k_p/4$ to 1 cm^{-1} , in wavenumbers, where k_p is the peak of the two-dimensional waveheight spectrum. Although laser profilometer data will not extend to 1 cm^{-1} , we can use the Stilwell camera data to enhance our knowledge of the high wavenumber end of the waveheight spectrum.

On 9 May 1973, a meeting was held at RTI between investigators from RTI, NRL and NASA-Wallops Station and PIMO personnel from NASA-JSC. The purpose of the meeting was as follows; discussion of how experimenters would know when their site was to be covered by the altimeter, ground truth planning, and coordination of common data processing tasks. From this meeting, it was determined that ground truth support for SL-2 would be sparse except in the Wallops Island test area. A number of action items were assigned in regard to unresolved ground truth topics. A large percentage of the data calibration/correction was determined to be common to all altimeter experimenters. Thus, among the experimenters, responsibilities for the various phases of data processing were established and are shown in the attached table.

Next Period Effort

As indicated by the attached table, this investigation has a majority of the responsibility for generating the mathematical models required for altimeter data processing. Thus, we intend devoting our entire effort to this task. We feel that our study of ground truth requirements has been essentially completed. We also intend to review the pre-processing schemes that will be accomplished by NASA-JSC.

Travel Summary and Plans

One two-man trip (PI & CoI) was taken to NASA-Wallops Station on 29-30 April for the purpose of investigating how best to obtain predictions of sea-state in the Wallops Island and North Atlantic test areas. It is anticipated that another trip to NASA-Wallops Station will be necessary during the next period in order to facilitate data processing efforts.

Financial Management Report

A financial report for this period is included as Appendix A.

for Gary S. Brown, Co Investigator
Lee S. Miller, Ph.D.
Principal Investigator

BASIC ALTIMETER DATA PROCESSING RESPONSIBILITIES

TASK	Generate Mathematical Models	Generate Computer Programs	Implement applicable data processing	Required Measurement Data
1. S&H bias offset correction	MBH	WS	WS	Martin*
2. S&H realignment & waveform reconstruction	MBH	WS	WS	
3. Pulse compression time sidelobe deconvolution	MBH	WS	WS	
4. AGC r-Factor	MBH	WS	WS	
5. SNR Determination	MBH	WS	WS	
6. Fluctuation statistics (plateau region)	WS	WS	WS	
7. Obtain rf hardware losses		WS	WS	
8. Tracker model	MBH	WS	WS	
9. Refined orbit (in altitude format)		WS	WS	
10. Process laser profilometer data		NRL	WS/NRL	
11. Process ns radar data		WS/NRL	WS/NRL	
12. Process Stilwell data		NRL	WS**	

MBH - Miller, Brown & Hayne

WS - NASA Wallops Station

NRL - Naval Research Lab

Martin - Martin Denver

* Wallops Station will check with Martin to determine if this data was obtained during testing.

** Wallops Station will contact D. Hammond to determine if Stilwell processing software can be made available.